

Name _____
Date _____

Teacher _____
Section _____

Geometry Unit 05: Logical Reasoning 2009 - 2010

Instructions: Select the best answer for each multiple choice item.

For those items that require computation or justification, show all work.



1.

If a and b are negative integers, then their product is always positive.

Which is the best statement regarding the converse of this conditional statement?

- A. The converse is false, because a positive product could also result from 2 positive numbers.
- B. The converse is false, because the product of 2 negatives could also be a negative.
- C. The converse is true, because a positive product can only result from 2 negative numbers.
- D. The converse is true, because the product of 2 negatives is always positive.

2.

If a conditional statement is true, which of the following is always true?

- A. The inverse of the statement.
- B. The contrapositive of the statement.
- C. The converse of the statement.
- D. None of the above are always true.

3.

For which of the following is the contrapositive true?





I. If an angle is acute, then it measures less than 90° .

II. If two angles are vertical angles, then they are congruent.

III. If two angles are supplementary, then their sum is 180° .

- A. I and II only.
- B. II and III only.
- C. I and III only.
- D. I, II, and III.

4.

Picture	Number of points on a line	Number of segments determined
	2	1
	3	3
	4	6
	5	10

Based on the pattern in the table, how many segments would be determined by a line containing 14 points?

- A. 45
- B. 66
- C. 91
- D. 105

5.

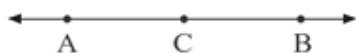
"If two angles form a linear pair, then they are supplementary."

Which best describes the inverse of this statement?

- A. The inverse is true because all supplementary angles form a linear pair.
- B. The inverse is true because angles that are not linear pairs cannot be supplementary.
- C. The inverse is false because angles that don't form linear pairs can still be supplementary.
- D. The inverse is false because angles that are not supplementary will not form linear pairs.

6.

What theorem can be used to deduce the following?



$$\overline{AC} + \overline{CB} = \overline{AB}$$

$$\overline{AC} \cong \overline{CB}$$

$$\overline{AC} = \frac{1}{2} \overline{AB}$$

- A. Point-Line Theorem
- B. Midpoint Theorem
- C. Overlapping Segments Theorem
- D. Reflections Theorem

7.

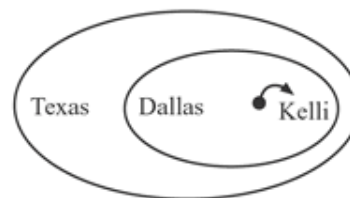
Use deductive reasoning to determine which statement is true based on the following information.

Marie, Parker, Nancy, and Jerry are teachers at the same high school, each teaching a different subject. The teachers teach either Math, Music, History, or Art. Parker uses calculators for his classes and no one else does. Marie's room is next door to the History teacher's room. Nancy and the Art teacher carpool together driving to work. The Music teacher and the History teacher have coffee each morning with Jerry.

- A. Marie teaches History
- B. Nancy teaches Math
- C. Parker teaches Music
- D. Jerry teaches Art

8.

The following diagram shows a conditional relationship.



Explain what you know about the converse of this relationship.

9.

Jonathon is a champion card house builder. The illustration shows the number of cards in each level as he builds a house of cards.



How many cards would it take to build a card house 13 levels high and break Jonathon's record?

10.

Give the inverse of the following statement, and indicate if the inverse statement is valid:

"Two angles with a sum of 90° are complementary."

11.

Complete the following "and" truth table.

p	q	p and q
T	T	
T	F	
F	T	
F	F	

12.

Write the contrapositive of this statement.

If Julie gets a summer job, then she will buy a car.

13.

Complete the following truth table for “If p, then q”

p	q	If p then q
T	T	
T	F	
F	T	
F	F	

Complete the table. If a statement is false, draw a counterexample.

	Statement	True/False	Counterexample
Conditional	If a figure is a square, then it is a rectangle.		
Converse			
Inverse			
Contrapositive			

14.

Complete the table. If a statement is false, draw a counterexample.

15.

Decide if the statement is true or false. If it is false, give a counterexample.

If $\angle DEF$ and $\angle DEG$ are adjacent acute angles, then $\angle FEG$ is an obtuse angle.

Answer Key

#	Item ID	Key	TEKS	Stimulus
1	MG1084803RX	A	G.3A	-
2	MG1084805RX	B	G.3A	-
3	MG1060646RX	D	G.3A	-
4	MG1084807RX	C	G.3D	-
5	MG1060644RX	C	G.3A	-
6	M0G00122RX	B	G.1A	-
7	M0G00129RX	D	G.3E	-
8	M0G000100RX	See attached Rubric or Checklist	G.3A	-
9	MG1084811RX	273	G.3D	-
10	MG1060650RX	See attached Rubric or Checklist	G.3B	-
11	MG1084813RX	See attached Rubric or Checklist	G.3C	-
12	MG1084815RX	If Julie does not buy a car, then she will not get a summer job.	G.3A	-
13	MG1084817RX	See attached Rubric or Checklist	G.3C	-
14	MG1084819RX	See attached Rubric or Checklist	G.3C	MG1084819RXp
15	MG1084822RX	See attached Rubric or Checklist	G.3C	-

Checklist List**8)**

The converse is not always true. The statement would say that if Kelli lives in Dallas, then she lives in Texas. The converse is that if Kelli lives in Texas, then she lives in Dallas. But to live in Texas, Kelli would not necessarily have to live in Dallas.

10)

Answer: The inverse is "If two angles do not have a sum of 90° , then they are not complementary." The inverse is true.



11)

p	q	p and q
T	T	T
T	F	F
F	T	F
F	F	F

13)

p	q	If p then q
T	T	T
T	F	F
F	T	T
F	F	T

14)

	Statement	True/False	Counterexample
Conditional	If a figure is a square, then it is a rectangle.	True	
Converse	If a figure is a rectangle then it is a square.	False	
Inverse	If a figure is not a square, then it is not a rectangle.	False	
Contrapositive	If a figure is not a rectangle, then it is not a square.	True	

15)

Answer: False

Counterexample: (Answers will vary but should be similar to the following :)

If $m\angle DEG$ is 20° and $m\angle DEG$ is 30° then $m\angle FEG$ will be 50° . That means $\angle FEG$ is acute, not obtuse.

Rubric List

8)

3	The response shows full understanding of the essential mathematics applicable to the task and a sound approach toward solution that includes logical reasoning and appropriate conclusions. Computation and procedures used are generally accurate, but the response may contain minor computational or procedural flaws that do not detract from evidence of full understanding.
2	The response shows a satisfactory understanding of the essential mathematics applicable to the task, but reasoning may not be completely clear, and there may be minor flaws in computation and/or use of procedures as a result of carelessness or non-essential misunderstandings. The flaws do not detract from evidence of satisfactory understanding. A score of 2 may also be earned if the response is partially correct but some aspect of the task is omitted.
1	The response indicates limited understanding of the essential mathematics applicable to the task. While an effort is made to address the task, omissions and/or errors related to insufficient mathematical knowledge or incorrect application of skills or procedures bring into question that student's ability to deal successfully with tasks of this type.
0	The response indicates no understanding of the essential mathematics applicable to the task, or there is no response.